DxAbx--A Computerized Tool to Aid in the Appropriate Selection of Antibiotics: Development and Use on a Local Area Network

Raphael J. Kiel, M.D., F.A.C.P.
Oakwood Hospital, Dearborn, MI

Background. The choice of antibiotic therapy is dependent upon the bacteriology of the infection, the sensitivity of the bacteria to the antibiotic regimen, the ability of the antibiotic to reach the infected site and the daily cost of the antibiotic therapy. Bacteriology of infection, antibiotic sensitivities and cost of daily therapy vary at different hospitals. These factors can be represented mathematically in a database and manipulated to display meaningful information to the clinician at the time of antibiotic choice. Availability of this program on a hospital local area network allows clinicians to obtain institution specific antibiotic recommendations at the point of care.

System Development. I have developed a Microsoft Access database, DxAbx, that assists the clinician in making informed antibiotic choices. The bacteriology of common infections was determined through a literature search; percent contributions of each organism to the infectious condition were recorded. Sensitivities of each organism to the antibiotics used at our hospital were gathered from recent antibiograms. A table of the pharmakokinetic properties and average daily cost of therapy was assembled using hospital pharmacy input.

The clinician begins the program by choosing an infectious condition (e.g. diabetic foot infection). Causative organisms with their percentages can then be displayed. The clinician can ask for a calculated utility for each antibiotic (sensitivity of the organism to the selected antibiotic multiplied by the percentage that each organism contributes to the infection). In addition, a cost effective ratio is displayed to show the utility of the antibiotic per unit cost of the antibiotic. Each antibiotic is further linked to its known pharmakokinetic characteristics. The clinician can request a list of antibiotics that are active against selected organisms. In addition, he can choose a combination of up to three antibiotics and explore their combined activity.

Program Distribution. The DxAbx program resides on the local area network drive of our institution. Our hospital system consists of six acute care hospitals, two skilled nursing facilities and several satellite clinics. The hospital local area network is in place at each facility. Institution specific antibiotic sensitivities, cost of antibiotic use and institution specific antibiotic use comments are being developed. These data are available for clinicians to utilize at the point of care in their institutions.

Conclusions. Since the bacterial spectrum of infection, sensitivity of organisms to antibiotics and cost of antibiotic therapy vary with hospitals, methods to correlated this somewhat disparate data are needed. In addition, access to information across a multi-institution organization requires efficient use of either a local area network or an intranet. The DxAbx program provides a tool for the physician to rationally choose antibiotic therapy based on hospital specific data.